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HOW MANY DOLLARS FOR INDUSTRIAL ADVERTISING?

Research in Progress
(ADVISOR* Project)

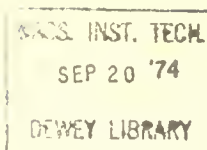
Gary L. Lilien

September 1974

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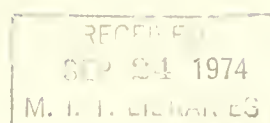
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* ADVertising Industrial products: Study of Operating Relationships

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Abstract

Companies selling to industrial and business markets face the problem of determining how much to spend for various elements in the marketing mix. Setting budgets for advertising and other marketing communication expenditures is especially difficult. This paper describes the ADVISOR project, a cross sectional study of current practice in setting communications budgets for industrial products. Anticipated managerial uses of the results are described as are the methodology of the study and progress to date.

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I. Project Overview

Every company selling industrial products faces the marketing-mix problem: How should funds be allocated to such activities as direct sales, customer service, and marketing communications (advertising and other customer-directed promotions)? Should a given product be advertised at all? What types of communications will best support current selling objectives? Are there special requirements, in this market, at this time -- competitive or otherwise -- which indicate a need or opportunity for changes in marketing expenditures?

Each company brings much experience and thought to setting budgets and making plans for marketing communications. However, to a large degree, these decisions are based on judgement and historical experience, rather than facts. Very little quantified intelligence exists on the relation of product and market characteristics to communications expenditures for industrial products. One reason for this is that to conduct such studies individually would, for most products, cost more than is economically justifiable.

We can differentiate between at least three classes of methods for allocating communications expenditures:

- a. Guideline Methods (Rule of Thumb)-- These include such suggestions as "budget a constant percent of sales," "match competition," etc.
- b. Objectives (Task) Method--This uses intermediate measures of effectiveness for evaluating communications programs and establishes cost constraints for various portions of total expense. It calls for explicit thought about various issues such as position in product life-cycle, state of the marketing environment and corporate objectives.

- c. Explicit modeling and/or experimentation method -- This approach attempts to relate marketing actions to profit or other objectives via theory and direct measurement.

None of these methods have been found to be cure-alls. Present guideline methods fail to answer the hard questions like "What percent of sales?" or "Why match competition -- what makes us think they're right?" Task methods introduce intermediate variables but have difficulty relating them clearly to final measures of effectiveness. Explicit modeling and experimentation are generally expensive. Basically, not enough is known about the sales response to industrial communications.

Yet, on the positive side, it is obvious that a large number of marketers have been making decisions for a long time and that in a pragmatic "survival of the fittest" sense they have, by and large, been successful. This means they have learned enough about their jobs to make good decisions, "on the average." Therefore, a careful study of current practice, the goal of the ADVISOR project, offers the possibility of developing a new form of guideline method. The method focuses on systematic cross-sectional analysis of current practice and infers decision making behavior from actual data. Although it would be presumptuous to expect a complete theory to emerge from this study, it is hoped it will be an important step toward answering the question posed in the title of this paper.

The goal of this study can be understood if one were asked what, given existing knowledge, is a pragmatic way to approach the problem. A good solution is to hire an experienced man who had worked on setting communications budgets for several hundred products with widely varying characteristics and communications needs. His accumulated experience would make him a valuable resource for aid in decision making; a systematic analysis of his experience

could lead to a new understanding of the objectives and results of the communications budget setting procedure. The goal of this study can be viewed as a duplication and analysis of the accumulated knowledge of this "experienced marketing man."

As of this date, twelve companies are participating in the study, providing data on 10-25 of their products, as well as project support. Table 1 lists current participants; more companies are expected to commit to participation before data collection is complete near the end of 1974.

Continental Can Company	I.T.T.
E. I. Du Pont de Nemours & Company	Monsanto Company
Emery Industries	Olin Corporation
General Electric Company	Owens Corning
International Harvester Company	U.S. Steel
Chase Manhattan Bank	Union Carbide

TABLE 1: Participating Companies
(As of August 15, 1974)

Data are being submitted on a range of marketing variables for each product included. Marketing expenditures for calendar 1973 are the basis for the study -- both as a total dollar amount and broken into sub-categories including, space advertising, direct mail, trade shows, etc. Partial data are also being collected for the previous year to establish "changes in 1973." The variables related to expenditures are a series of product and market characteristics, including:

1. Direct sales expense for the product.
 2. Industry sales of product and growth rate.
 3. Company sales of product and growth rate.
 4. Approx. number of 1973 company customers.
 5. Approx. number of potential customers (non-buyers).
- Geographic concentration of customers.

7. Product Return on Investment.
8. Product Return on Sales.
9. Product production capacity utilization - industry and company
10. Distribution -- geographic and number of levels.
11. Position in product life cycle.
12. Product uniqueness (rating).
13. Product - company association (rating).
14. Cost significance of product to user (rating).
15. Technical service expenses.
16. Market purchasing practices (rating).
17. Opportunity for marketing communications spill-over to related products (rating).

These data will then be analyzed in order to (1) determine and quantify the market and product factors which influence the decision of whether or not to use marketing communications in promoting a given product or product category; (2) determine and quantify the market and product factors which influence how much and what types of marketing communications are used; (3) establish guidelines for use by individual companies in determining whether other companies would be expected to use marketing communications under particular product/market conditions and, if so, how much and how they would allocate the budget among the various forms of marketing communications.

An additional study objective is to develop sufficient understanding of this process to be able to do initial research on the development of decision making aids in the industrial communications area.

2. How the Output Relates to Process or What's in it for Marketing Management?

This study will identify those market and product factors which most importantly affect marketing communications expenditures levels. An analysis will be generated for each product included in the study, comparing its performance with an "industry average" as determined by the model. This could be used as input for individual product audits by participating companies.

An interactive computer program will be developed which will allow participants at remote terminals to "play" with the model. A user could enter marketing data in a conversational mode and get the results one would expect from the "experienced marketing man" mentioned earlier, given those inputs. This program could be of aid to participants to:

- * check their existing practices and possible future strategies against the norms determined by the analysis;
- * develop possible spending levels for new products or those not currently using marketing communications;
- * provide new input and rationale for recommending budget levels to product marketing people.

Appendix A includes a very rough example of such a system.

A report will also be made assessing the feasibility of developing a model which aids in deciding how much should be spent for communications.

To summarize, the research described here should be of direct use for the product or advertising manager as well as for the general manager as follows.

For the product or advertising manager:

- * As changes take place in marketing goals or in the marketing environment, guidelines are available to adjust budgets.
- * The list of variables is identified and available which includes the most important factors affecting budgets.
- * Magnitude as well as the direction of change are provided.

- A norm can be produced for a product or, alternatively, a set of adjustments to an existing budget necessitated by market or product changes, can be produced.
- The effects of several, simultaneous changes can be assembled separately or jointly.

For the general manager:

- He will receive quantitative support for the budget allocation decisions and reviews he is responsible for making.

APPENDIX A: PROTOTYPE INTERACTIVE PROGRAM

Page 8 lists the conversational input for an example of the type of interactive program envisioned as a result of this project. The hypothetical product is called ENGINE EASE (user inputs are underlined); it is a chemical product, with a 20% profit margin, is relatively new, etc.

Page 9 gives the model analysis of the communications budget for the product. The input is first reprinted for review. Then a statement is made telling that the characteristics of this product lead to an estimate of \$25,000 as an advertising budget reference value as opposed to \$13,500 for an average product with this sales rate (one with all factors $\{0_i\} = 1$).

The individual factor effects are then listed along with the product of those factors, 1.87 in this case.

In an operational version of this model the user could then modify any one or set of inputs and re-run the analysis.

This is ADVISOR Demo (Aug 1974). . The Program develops reference point estimates for communication expenditures for industrial products

input product name

? ENGINE EASE

input industry code no. (no.=1-6....input 7 for code list)

? 7

1	=	instruments, optical equipment
2	=	machinery and equipment (non-electrical)
3	=	fabricated metal products
4	=	electrical equipment
5	=	chemicals
6	=	raw mtl's

input industry code no. (no.=1-6....input 7 for code list)

? 5

prompted input desired? (1=yes)

? 1

1. input industry avg customer/salesman ratio

? 40

2. input product customer/salesman ratio

? 60

3. input industry avg profit margin as a fraction of selling price

? .1

4. input product profit margin as a fraction of selling price

? .2

5. input fraction of competition in market less than 5 years

? .4

6. input smallest geographic fraction of the country covering 80% of industry customers

? .8

7. input smallest geographic fraction of the country covering 80% of product customers

? .5

8. input fraction of potential plant capacity currently used for product

? .6

9. input current perceived stage in product life cycle as an index

0=new 5=growth peak 10 oldest

? 1

10. input company posture toward product as an index

0=unimportant prod 5=avg treatment 10=top priority

? 9

11. input product uniqueness rating as an index

0=indistinguishable product 5=several similar 10=unique

? 8

12. input avg no of people normally involved in buying decision

? 7

13. rank purchase habits for this product from 0=completely structured (as in govt bids) to 10=impulse decision

? 7

14. input annual company sales in millions \$

? 10

15. input annual product sales in millions \$

? 2

ADVISOR DEMO RESULTS

Input data for ENGINE EASE was given as follows

Value	Data Element
1 80	ind cust/salesman ratio
2 60	prod cust/salesman ratio
3 0.1	ind avg prof marg(fract of price)
4 0.2	prod prof margin
5 0.4	fract of comp in mkt <5 yrs
6 0.8	industry concn (80% cust)
7 0.5	prod concentration
8 0.6	fract plant capac used
9 1	life cycle (0=new 10=old)
10 9	attitude to prod index
11 8	prod uniqueness rating
12 7	no people in buy dec
13 7	purch habit index
14 10	company sales(million \$)
15 2	prod sales (million \$)

Industry average ad levels for products with this sales rate is 13.5 (thousand \$).

The characteristics of this product (1-15 above) lead us to estimate an ad budget reference value of 25.2253 (thousand \$) distributed as:

Direct Mail= 5.04505
 Space= 12.6120
 Other= 7.56758

The above factors affect ad estimates as follows:

Effect	Item
1 0.897959	salesmen
2 1.07778	margin
3 1.10744	competition
4 1.1284	cust concn
5 1.144	plant util
6 1.0372	life cycle
7 1.0372	prod-attitude
8 1.0648	uniqueness
9 1.02901	people in buy dec
10 1.0428	purch habits

This yields a total effect (multiplying 1-10) of 1.86854

APPENDIX B:

The Industrial Advertising Budgeting Process: An Initial Theory

During the pilot phase of this project a number of in-depth interviews were conducted with industrial product brand managers and advertising managers from participating companies. Figure 1 synthesizes, in simplistic terms, a typical view of the budgeting process.

Figure 1 represents basically advertising budget formation by the task method. Product objectives (goals for market share, increasing reach, obtaining new customers, etc.) are set. Uncontrollable variables -- product characteristics (uniqueness, stage in the life cycle, etc.), company characteristics (sales level, etc) and competitive environmental characteristics (number, distribution and aggressiveness of competition, etc.) -- are reviewed. And other non-controllable elements in the communication mix -- the level of personal selling and technical service for the product -- are also considered.

These characteristics lead to a proposed advertising budget as well as a budget allocation and media schedule. The overall budget number is then reviewed to see if it is too high for managerial approval. If it is not, the budget is set; if it is too high, the product objectives are revised along with the advertising budget until the two are consistent.

With this understanding of the process, the following prototype model is proposed:

$$\text{Sell\$} = D \prod_{i=1}^I O_i \prod_{j=1}^J UP_j \prod_{k=1}^K UC_k \prod_{l=1}^L UE_l \text{ error}$$

$$\text{Ad\$} = \text{Sell\$} \cdot C \cdot I \cdot \text{error}$$

ADVERTISING BUDGETTING PROCESS:

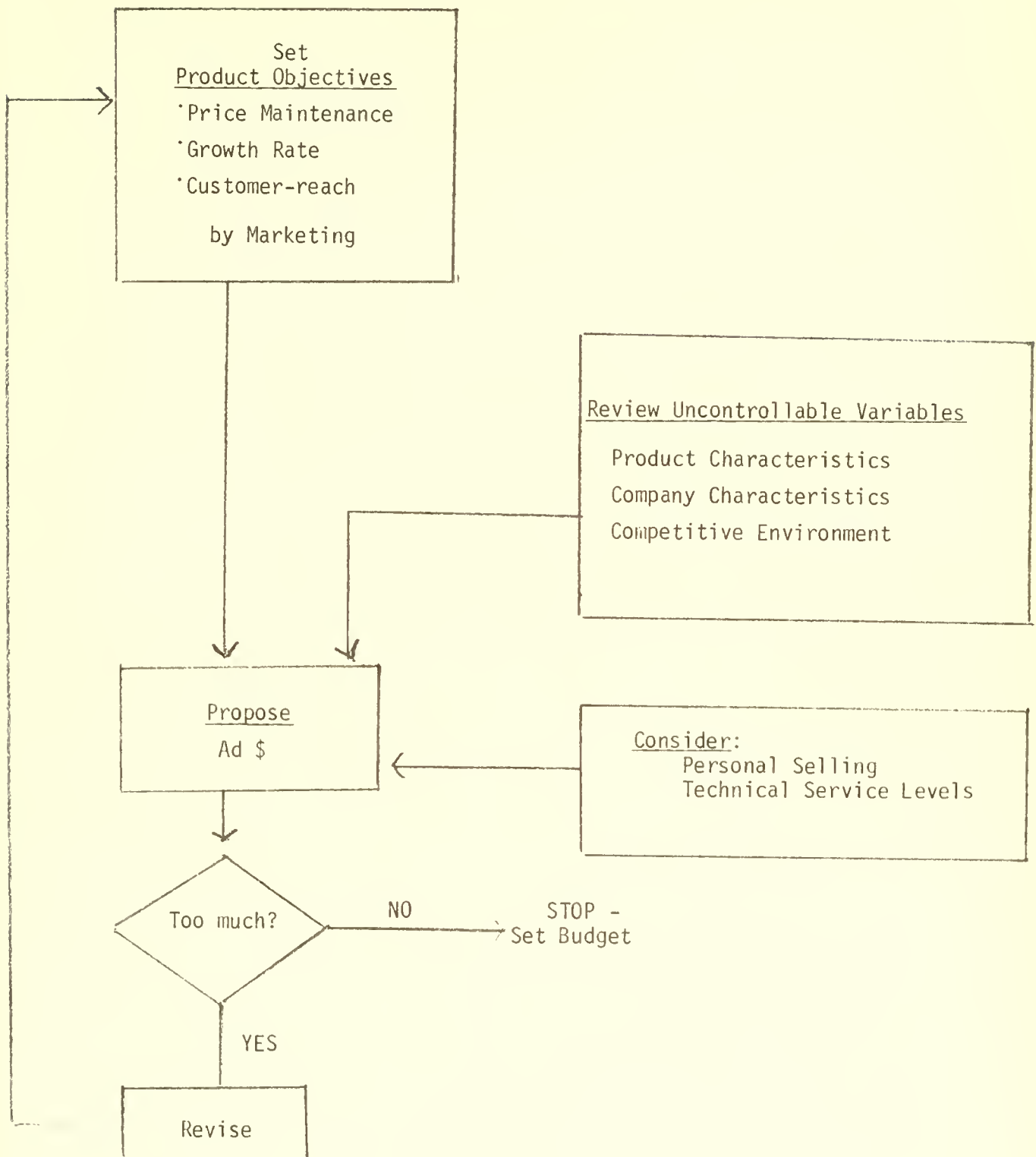


FIGURE 1

where the variables above are as follows:

1. $Ad\$$ = advertising + promotional \$ budget.
2. $Sell\$$ = $Ad\$$ + personal selling + technical service expenses.
3. $\{O_i\}$ = Controllable Variable indices:
 - * Price/Margin index
 - * product growth objectives
 - * objectives for reaching new customers, etc.
 - $i = 1, \dots I.$
4. $\{UP_j\}$ - Uncontrollable Variables Indices
 - * Product Characteristics:
 - * Uniqueness
 - * Stage in life cycle
 - * Perceived quality, etc.
 - $j=1, \dots J.$
5. $\{UC_k\}$ - Uncontrollable Variables Indices
 - * Company Characteristics:
 - * company size
 - * company-product association, etc.
 - $k=1, \dots K$
6. $\{UE_l\}$ - Environmental Characteristic Indices
 - * Competitive concentration
 - * Market-aggressiveness, etc.
 - $l=1, \dots L.$
7. CI - customer concentration index ($1 \geq CI \geq 0$), 0 = small concentrated set of customers;
 $1 \Rightarrow$ very large diffuse set of customers.
8. D - Product constant.

Note that variable sets (3) through (6) are indices; an "average" product should get a "1" on each index scale. The theory here is that a product with a high advertising budget will have associated high index variable values. Figures 2, 3, and 4 give some hypothesized shapes for index-values.

FIGURE 2

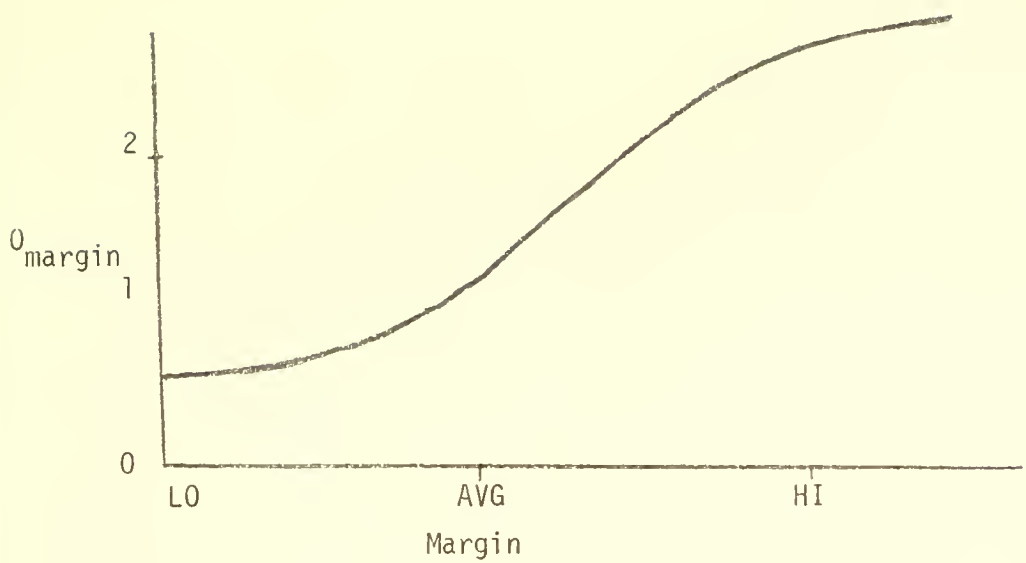


FIGURE 3

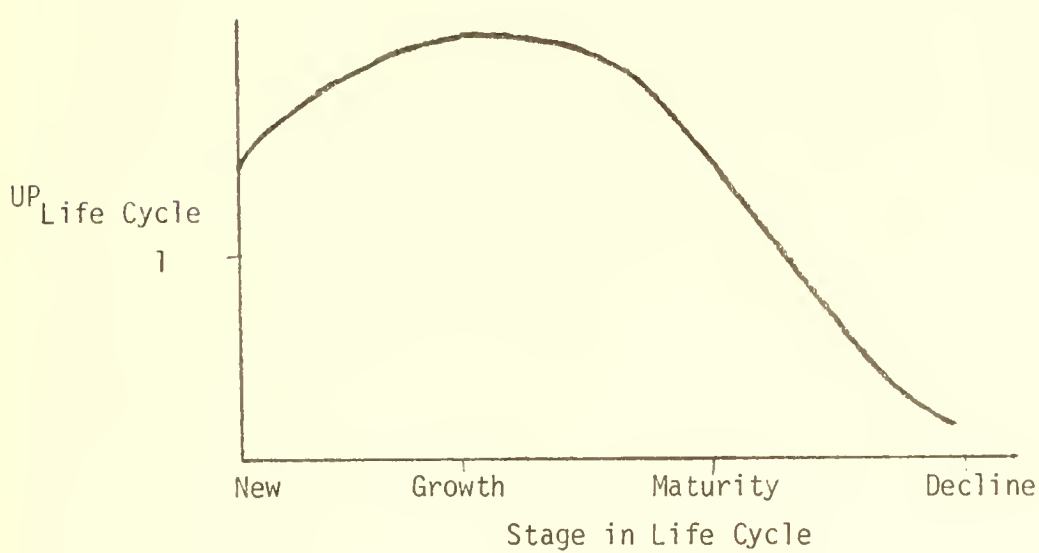


FIGURE 4

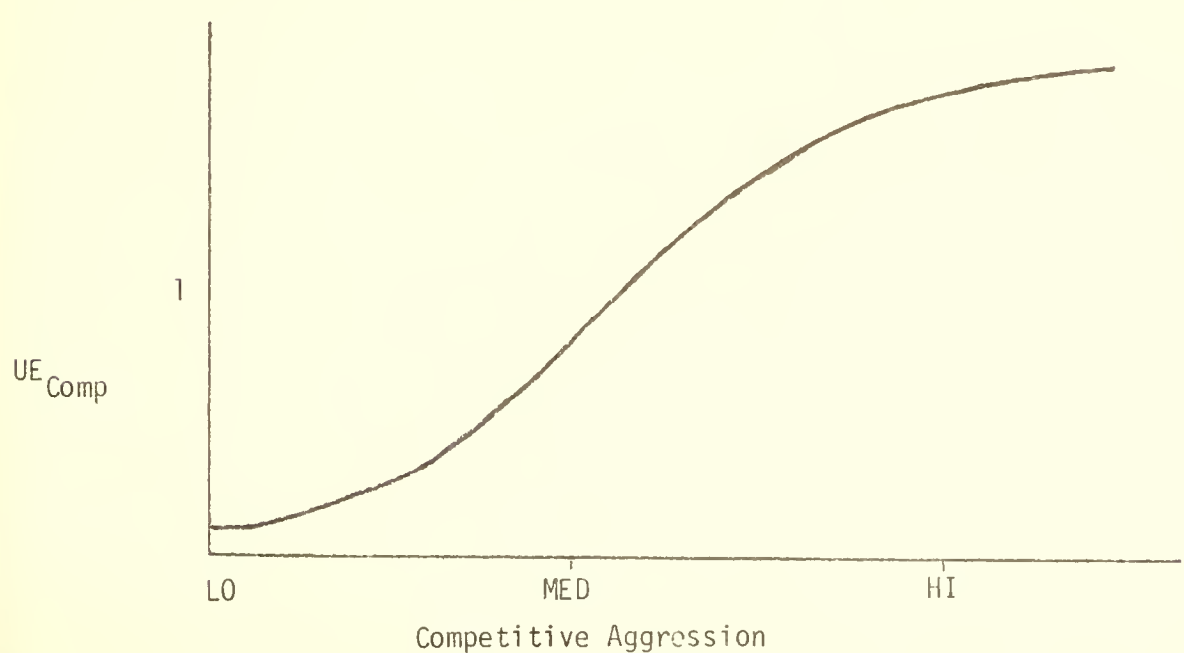


Figure 2 indicates that it is generally felt that higher profit margin products receive proportionally higher ad dollars. Figure 3 traces the role of communications throughout the stages of the product life-cycle. Figure 4 indicates that aggressive competition generally leads to high communications expenditures.

Figure 5 describes the hypothesized relationship between the numbers and dispersion of customers and the customer concentration index (CI).

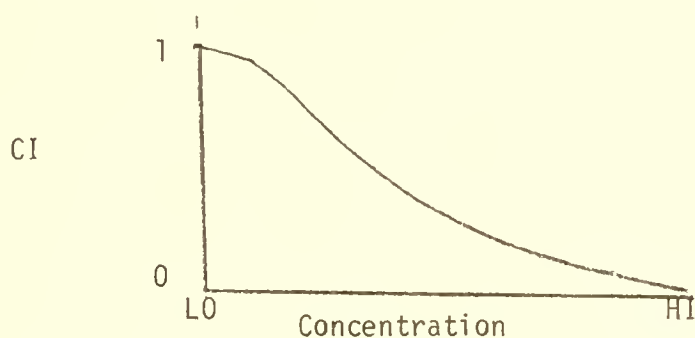


Figure 5

Note that, according to the model, the larger the value of CI, (the more diffuse the set of customers), the larger Ad\$ is as a fraction of Sell\$. Conversely, as the number of customers becomes small and geographically concentrated, Ad\$ as a fraction of Sell\$ decreases.

This is, of course, a naive, simplistic model which must be viewed as a prior, pre-data model. Before this investigation is finished we hope to test a number of hypotheses and model-assumptions and, then, to be able to support empirically the model presented.

APPENDIX C: PROPOSED PROJECT METHODOLOGY

The data supporting the project analysis will be vectors of coded product-information associated with some 200 or so products from participating companies. (see Appendix 2 for a discussion of security procedures). The number of controllable and uncontrollable variables being analyzed will be of the order of 30-40. Clearly, there are likely to be strong dependencies among these variables. Therefore, as a first step, we intend to perform some type of factor analysis to reduce the dimensionality and increase the independence of the included factors.

The results of this factor analysis should be of considerable theoretical interest: what product (or market, or environmental) characteristics always (or nearly always) occur together? For example, is market aggressiveness (as measured by relative changes in market share) always related to high average competitive spending for advertising dollars?

After this factor analysis is complete, a somewhat reduced set of less highly dependent factors will be included in the model. Product data will then be used to estimate the parameters associated with this reduced model.

As an example, a functional form which might be used to represent the curve in Figure 2 is:

$$O_{\text{margin}} = k_1 + \frac{k_2 m^\alpha}{1+m^\alpha} \quad \text{where } m = \text{margin, and } k_1, k_2, \alpha \text{ are parameters.}$$

In this case, O_{margin} is constrained to vary between k_1 and k_2 as m varies from 0 to infinity. The curve is also monotonically increasing as described in Figure 2. In this case, three parameters are needed to describe the index curve.

The actual estimation methodology will, of course, depend on the final choice of model and will be discussed in future publications.

APPENDIX D: DATA SECURITY PROCEDURES

The security and anonymity of the project data are provided by the following procedures.

1. The Company representative collects the needed data and enters it on the basic ADVISOR questionnaire. This form is retained by the company representative and does not leave company possession.
2. The company representative multiplies all the starred (*) questionnaire data items by a "company security factor." The selection of this number is discussed below. The disguised data are then entered on a fresh questionnaire for transmittal to the Project Director. The company is identified on this form only by a company code and the product only by product code. Only the company representative knows which product has which code.
3. Upon receipt of the disguised data, the M.I.T. Project Director separates the company code from the rest of the data. Only the Project Director knows and maintains the key which relates company code to product code. The remaining data, identified by product code, is entered into computer storage under password security. The code key and the originals of the disguised data are kept in a locked filing cabinet by the Project Director.
4. The M.I.T. Study Team believes that for certain analyses, it is highly desirable to examine the data in undisguised form. (The product identity continues to be entirely concealed). Accordingly, where possible, the company representative is asked to transmit to the Project Director the value of the company factor. The Project Director is the only person outside of the company who knows the factor. He stores it in a locked file cabinet, and introduces it into the computer only on a temporary basis for specific analyses requiring it.
5. During the course of the study, only the M.I.T. Study Team has access to the data. Access to the computer-stored data is secured by password.
6. At the completion of the study, companies or other research teams may wish access to the disguised data. Such access will be granted only after the approval of the participating companies. Any company has the right to withdraw its data from the data base at that time.

SELECTION OF PRODUCT CODES, COMPANY CODES AND COMPANY FACTORS

1. Product codes are four-digit random numbers. The Project Director supplies a set of code numbers to each company representative to be assigned to products as the company sees fit.
2. The company codes are two-digit random numbers. Each company is assigned a number by the Project Director who reveals it only to the company involved.
3. The company security factor is a number between .9 and 1.1 set by the company without the participation of the study team.

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